

limited its field of operation and discovery. "It has already furnished us with a clue to many of the mysteries of life, and we look to it for many more: what is life? what is death?" This last quotation will show that he puts no limit to the phenomena to be considered in the investigations of the biologist; but when man has solved all these problems, he will be as wise, if not as powerful as the gods.

SOUTH AMERICAN TRAVEL *

II.

Travels in South America, from the Pacific Ocean to the Atlantic Ocean. By Paul Marcoy. Illustrated by 525 engravings and ten maps. Two vols. (London: Blackie and Son, 1875.)

The Amazon and Madeira Rivers: Sketches and Descriptions from the Note-book of an Explorer. By Franz Keller, Engineer. With sixty-eight illustrations on wood. (London: Chapman and Hall, 1874.)

Two Years in Peru, with Exploration of its Antiquities. By T. J. Hutchinson, M.A.I. With map and numerous illustrations. Two vols. (London: Sampson Low, 1873.)

MR. KELLER'S work is a much more business-like and compact production than that of M. Marcoy, noticed in last week's number. While the beautiful illustrations which enrich the book show that the author has a high power of artistic reproduction, and while this may have led him to throw over the scenes he endeavours to reproduce a little touch of glamour, a little of "the light that never was on sea or land," one feels on reading Mr. Keller's narrative that he is in the hands of a thoroughly earnest and trustworthy observer. He has, however, committed the sin of publishing a narrative of exploration without a map. We should mention also that not one of the three books we are noticing contains an index, a want which will considerably impair their usefulness to the student.

Mr. Keller's work is almost entirely concerned with the Madeira, the largest tributary of the Amazon from the south. His journey from the time of his departure from, till his return to Para was accomplished between November 1867 and December 1868, a period of thirteen months, during which, including vexatious delays, he ascended the Madeira as far as Trinidad, on the Mamore, in Bolivia. If our readers look at a map, they will see that Mr. Keller could not have been idle during the time, especially when it is remembered that his purpose was to make a careful hydrographical inspection of the Madeira, in order to report upon the possibility of utilising it as a navigable highway for commerce.

The river, as far as Santo Antonio, seems capable of being rendered quite navigable, but above this the rapids are so numerous and formidable that it seems hopeless to expect that the upper river can ever be made available for anything but boats. The only means, therefore, by which the treasures that exist in the interior of South America can be made accessible by the Madeira route is by a railway from Santo Antonio upwards. It would seem that some such project is in contemplation. The construction of railways, we learn from Mr. Hutchinson's work, is

being carried out rapidly in Peru on a very extensive scale, mainly under the superintendence of Mr. Henry Meiggs, who has difficulties of the most formidable kind to contend with in piercing the Andes; in a short time, however, we may expect to see all parts of this country easy of access. In Brazil the mere engineering part of the work would seem to present no difficulties whatever.

Before any such scheme is carried out, ere the whole of this primeval region be devirginated by swarms of white men, we hope that its natural history and ethnology will be fully if not exhaustively investigated. In this respect such works as those of Marcoy and Keller are of great value.

Mr. Keller made excellent use of the short time he spent in the interior; for while he most faithfully and successfully accomplished the mission with which he was entrusted, he at the same time made a series of really valuable observations on all that he saw that was worth noting. His narrative is not, however, arranged in the same method as that of M. Marcoy, who recounts each day's experience as he proceeds, and in whose case, therefore, the want of an index is peculiarly felt. Mr. Keller has systematised the results of his journey, and in a series of chapters gives a clear and well-written summary of his observations. In an introductory chapter he gives a brief account of what is known of the physical and social condition of Brazil and of its political history. He then, in two chapters, gives a sort of itinerary of his expedition up the Madeira, with occasional observations on the inhabitants and the natural history of its banks, and a very clear and full account of the difficulties attending his attempt to navigate the river, so studded with rapids, past every one of which his fleet of boats had to be carried. The region seems to be very sparsely peopled, though its natural resources are superabundant. The material of the hills over the whole region of the rapids he found to be the same; "gneiss, with mostly a very pronounced stratification, and always the same run. He examined it very closely," he states, "expecting to find, according to theory of Agassiz, numerous erratic boulders of different composition lying on the regularly formed rock. But neither there nor higher up in Bolivia could we discover any trace of these 'foundlings,' even as Agassiz himself was unable to discover, in the environs of Rio de Janeiro, the *roches striées* and *roches moutonnées* of Switzerland, which testify to an ice-period with its immense glaciers."

In the chapter headed "Canoe and Camp Life," Mr. Keller gives a graphic account of the daily life of an expedition such as his; and in another, on "Hunting and Fishing," he gives a pretty full idea of the larger fauna to be met with on the route he traversed. In the succeeding one he describes the vegetation of the virgin forest of the Madeira and Amazon, devotes considerable space to the Caoutchouc Tree which so abounds here, and to an account of the process by which its sap is converted into the indiarubber of commerce. He also gives a list of the other principal plants which are utilised for commercial purposes, in the shape of medicines, oils, resins, dye-stuffs, ropes, &c.; and it strikes one that it would certainly be worth while to make a region so superabundantly stored with animal and vegetable life of such great practical utility to man, easily accessible to the merchants of the world.

* Continued from p. 235.

To the wild tribes of the Madeira Valley, the Múras, the Aráras, the Mundrucús, the Perententins, the Caripunas, &c., Mr. Keller devotes a chapter. By the encroachment

of white men, and by the ministrations of the Jesuit missionaries, these tribes, like many others in South America, are considerably changed from what they were when the

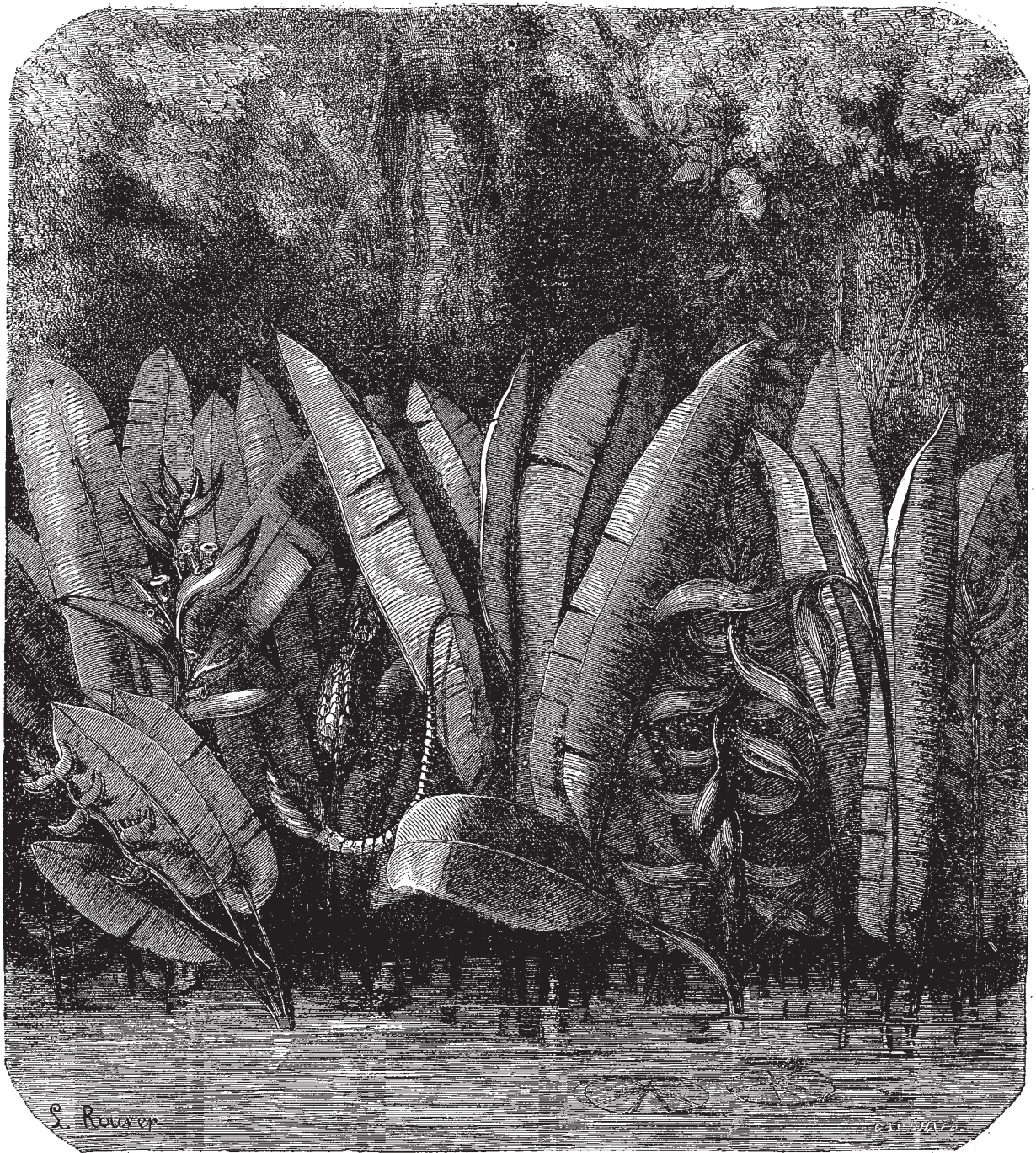


FIG. 3.—Reeds (*Canna*) on the Ucayali.—Marcoy.

continent was first discovered, and, as we said in our last number, are much diminished in numbers. If we may trust the individuals who figure in Mr. Keller's illustrations, there must be some splendid specimens of men and

women among them. The Indians in this region are, however, far from being tamed, and not unfrequently resent the encroachment of the white man after a very bloody fashion, though wherever they come in contact

with the latter "their doom is sealed," as Mr. Keller truly says. He justly cries out upon the sentimentality which laments the extinction of the "noble red race," a race which exists only in the pages of the novelist. The red race of North America must soon become extinct, and leave its hunting-grounds in entire possession of the white man, who will make a better use of them than ever did the aboriginal possessors; and we fear, if the red man of South America proves himself no fitter to survive than his northern brother, he must follow the latter to those "happy hunting-grounds" where no white man is ever likely to intrude. Looked at, as Mr. Keller says, in the broad light of what is the best for the race as a whole, however sorry we may feel for the "poor Indian," and still more so for the race or races that have left so many astounding monuments of their advancement along the west coast of South America and in some parts of North America, it would be useless, if advisable, to attempt to prevent it. There seem to exist evidences in America, as elsewhere, that probably before the advent of any existing people the earth had its human inhabitants, who were compelled to melt away before others of a higher type, who again had to succumb before still stronger brethren. This process has been going on as far back as we can trace, and when it will cease, if ever, who can tell?

Among all the numerous tribes of the interior of the South American continent, Mr. Keller discovers two well-marked types. "One of them, the Guarani, of the widely-spread Tupi tribe, showing the well-known eagle-profile of the North American Indians, first-rate pedlars and fishers, generally keep near the large rivers; while the others, the Cervados, or Ca-en-ganges (forest-men), as they call themselves, more warlike and high-handed, carrying off and enslaving whomsoever they can, do not use canoes at all, and prefer the wooded ravines of the lateral valleys, or the grass-grown ridges of the Campos. . . . Their oblique eyes, short nose, and high cheek-bones, strongly remind one of the Mongolian type, though by this remark I would not imply their direct Asiatic origin. . . . The Guarani, although their outward appearance and character recall the old Mexican tribes, seem to have come in all probability from the south, and to have spread thence all over the continent." As these statements are given in Mr. Keller's introduction, they may be regarded as not so much the direct results of his own observation, but as to a great extent a statement of the most approved theory of the native American populations. It tallies to some extent with the theory contained in Marcoy's work, and with the conclusions reached on craniological grounds by some of the best existing anthropologists. It seems to us, however, that before any definite conclusion can be reached, much yet remains to be done. Meantime we may say that we consider Mr. Keller's work a valuable contribution to the literature of South American Travel; the illustrations are delightful, and the engraver has done his part in a masterly style.

The chief value of Mr. Hutchinson's work, from our point of view, consists in the detailed account he gives of explorations among the still mysterious ruins which litter the maritime districts of Peru from south to north. But this is not its only value. Mr. Hutchinson was two years in Peru—1871-73—as her Majesty's Consul at Callao,

and during that short period his work proves that not only did he find time to explore nearly every important cluster of ruins in the country, but to make himself master of the social, political, and industrial position of the republic. His picture is a somewhat brighter one than that given by M. Marcoy twenty-three years before, and it would seem that the country has really advanced in several respects during that period. By means of several excellent steamship companies it is now in almost daily communication with North America and Europe, and this has led to a considerable development of its resources. As we have already said, railways are in course of construction all over the country, and it is even in contemplation to carry one right through the Andes to the Ucayali, by which the problem of direct communication between the east and west coasts would be solved. Education seems to be claiming some attention, and a Society of Arts has been founded, which we sincerely hope will give early and energetic attention to the prehistoric ruins which enrich Peru, from which so much has yet to be learned concerning their history and their builders. The people, however, have still much laziness to get rid of; but we hope that under the intelligent and vigorous administration of President Pardo, and the stimulus of increased communication with other nations, they may gradually be aroused to healthy exertion.

It is unnecessary to enter into details concerning the Peruvian ruins, the nature of which is known to most of our readers. Colossal walls of adobes, or large sun-dried bricks, the remains of immense buildings whose purpose seems yet doubtful, terraced mounds or hills hundreds of feet in height and covering an area of several acres, aqueducts, huacas, or burial mounds, containing thousands of carefully-buried skeletons, with the knees and hip-joints bent, some of them with the hair and bits of flesh still adhering, with their original wrappings and the articles placed beside them when they were buried; abundant remains of pottery, many of them giving evidence of considerable ingenuity, skill, and taste in the makers; masks, images, and other relics, all affording evidence of a numerous population of great energy and of a civilisation of no mean grade.

The great question in connection with these remains is, who were the original builders? As our readers know, the generally accepted story is that they were built by the Incas, the name given to the race dominant in Peru for some centuries previous to the advent of the Spaniards. This, however, is not the opinion of Mr. Hutchinson, who has no patience with the advocates of this theory, and who has rather a contempt for the Incas as the destroyers of a civilisation much higher than their own. He regards Garcilasso's history as a mere piece of gasconading. His own theory seems to be that the Incas found the buildings whose remains still exist, when they made their advent in Peru, and forced upon the people whom they conquered the worship of their great deity the Sun. The real builders were the Yuncas, who dispossessed the Chinchas, the latter themselves finding upon their arrival an aboriginal race, some relics of whom Mr. Hutchinson believes have been found sixty-two feet deep under the guano deposit on the Chincha Islands. When we consider the slowness with which these droppings of birds must have accumulated, it carries back the first advent of

man in South America to a time which must be measured by thousands of years.

It seems to us a herculean task to attempt to unravel the ethnology of Peru, which we suspect can only be adequately done in connection with that of the whole American continent; but it is a task which is well worth attempting. A vast amount has been written on the subject, and there exists a great wealth of material; it seems to us that

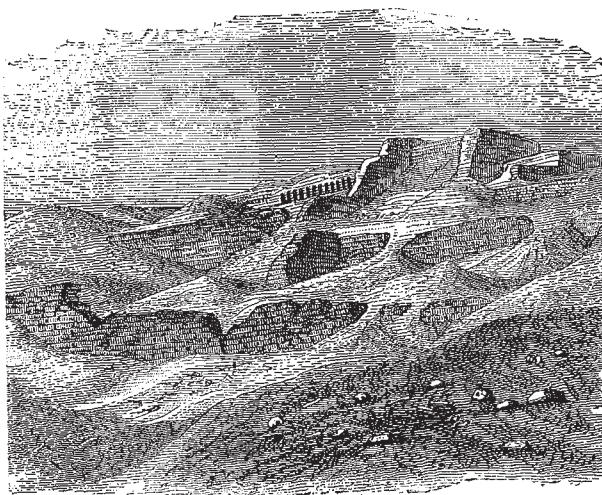


FIG. 4.—Ruins of Reputed Temple of the Sun at Pacha-camac.—Hutchinson.

what is now wanted is a man possessed of the necessary wide grasp of mind and extensive knowledge to set himself to collect, arrange, and sift this material and investigate on strict scientific principles the bearing of the results. From such a process, we believe, some definite

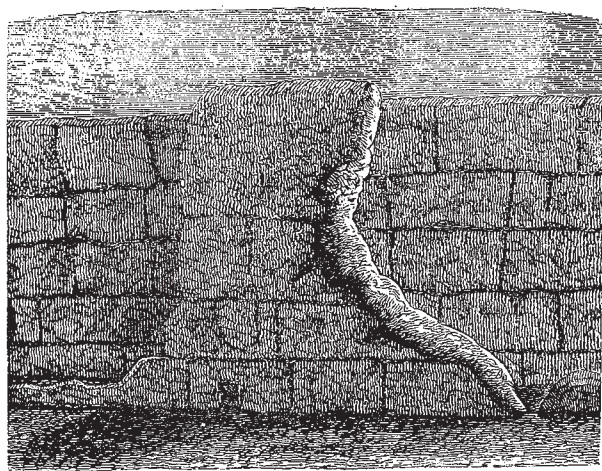


FIG. 5.—Part of Ruins of Double Wall of Temple of Rimac.—Hutchinson.

and valuable conclusions would be arrived at, as definite, perhaps, though not nearly so comprehensive, as those which have been reached concerning the Indo-European peoples; for there still remains much material to bring together, and no time should be lost in setting about the work. Mr. Hutchinson suggests that if some one would do for the remains in Peru what Schliemann has done for those of Troy, and George Smith has done for those in

Assyria, the results would be of higher value than any yet achieved. Let some one with the patience, enthusiasm, and knowledge of Dr. Schliemann, devote the necessary time to the careful excavation and study of the mounds and clay-covered buildings, and we are sure the results will well repay the labour. Let us hope that the present Peruvian Government will be patriotic and generous enough to inaugurate and bear the expense of the work, and thus gain for themselves the admiration and thanks of the civilised world. Talking of Dr. Schliemann, Mr. Hutchinson points out some very remarkable coincidences between the buildings and relics which that explorer has unearthed, and those which Mr. Hutchinson himself has found in Peru. Whether this be more than a coincidence it would be rash at present to conjecture.

Mr. Hutchinson's work must be regarded as one of the most important contributions that have been made to the archaeology of Peru, and we hope that though no longer resident in the country, he will continue to investigate the subject and help to reduce its present confusion to something like order. We think, however, he might have a little more patience with the theories of other investigators, and not hastily cast them aside as unworthy of notice; the labours of all competent and earnest workers should be seriously studied, for thus only can the full truth be arrived at; even in the legends of Garcilasso he might find some speck of valuable truth.

WATSON'S "DESCRIPTIVE GEOMETRY"

A Course in Descriptive Geometry. By William Watson, Ph.D. 4to. double columns, pp. xi., 147, with thirty-two plates and three double plates of stereoscopic views. (Boston: Osgood and Co. London: Longmans, Green, and Co., 1874.)

DESCRIPTIVE Geometry affords the practical means of dealing with geometry in three dimensions, in the same manner that Practical Geometry, that is to say, the intelligent use of drawing and of graphical methods, deals with plane geometry. If, in solid geometry, we concerned ourselves only with points and with lines, whether straight or curved, we might say that descriptive geometry was simply the science of plan and elevation. As regards the point and the line, it is nothing more. But what distinguishes descriptive geometry, as it was published to the world in Monge's celebrated treatise, from what was already known to every intelligent builder or carpenter, is the means of *indicating* surfaces, whether plane or curved, as well as of *representing* points or lines. We use the terms *indicating* and *representing* advisedly, as carrying with them a real distinction, which, we regret to see, is not always brought prominently forward in the treatises, and sometimes fails to be perceived by the student until he has wasted valuable time in groping after a misapprehension. It is indeed evident that a surface cannot be represented in the same sense that a point and line are, for its plan and elevation would be simply two black patches, the contours of which would give the boundaries of the surface in certain directions, but would fail to represent the surface itself. Now, the method published by Monge regarded a surface, whether plane or curved, as completely indicated so soon as its geo-